(Established 1832).

AMERICAN ENGINEER AND RAILROAD JOURNAL.

PUBLISHED MONTHLY

BY

R. M. VAN ARSDALE

J. S. BONSALL,
Business Manager.

140 NASSAU STREET, NEW YORK

R. V. WRIGHT, } Editors.
E. A. AVERILL, }

FEBRUARY, 1908

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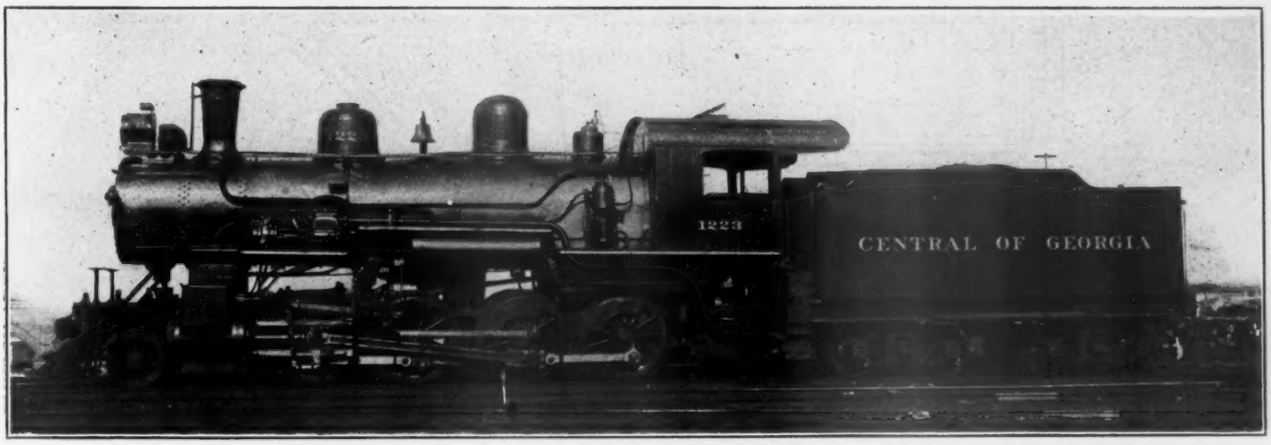


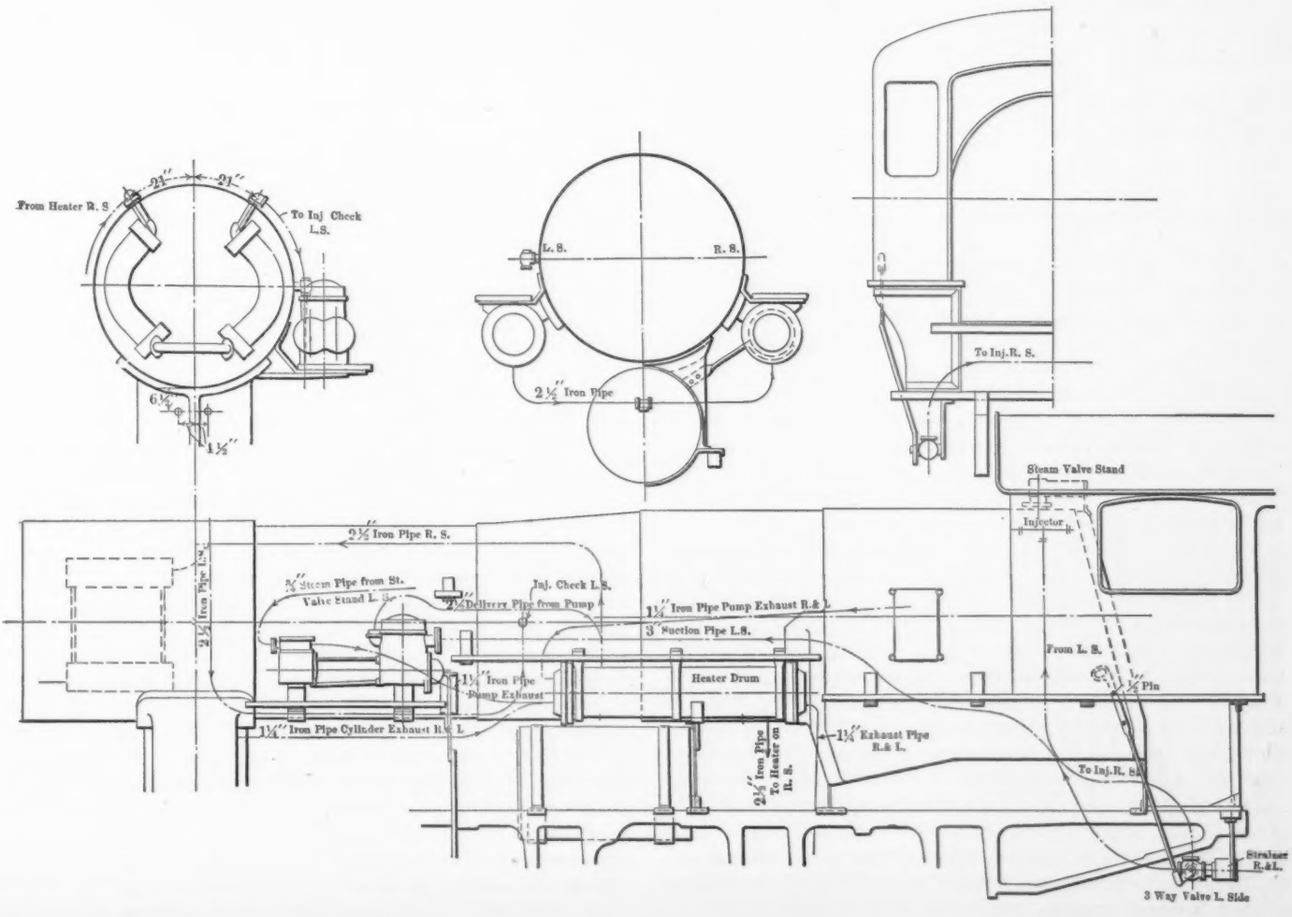
CONSOLIDATION LOCOMOTIVE WITH FEED WATER HEATER—CENTRAL OF GEORGIA RAILWAY.

LOCOMOTIVE FEED WATER HEATER.

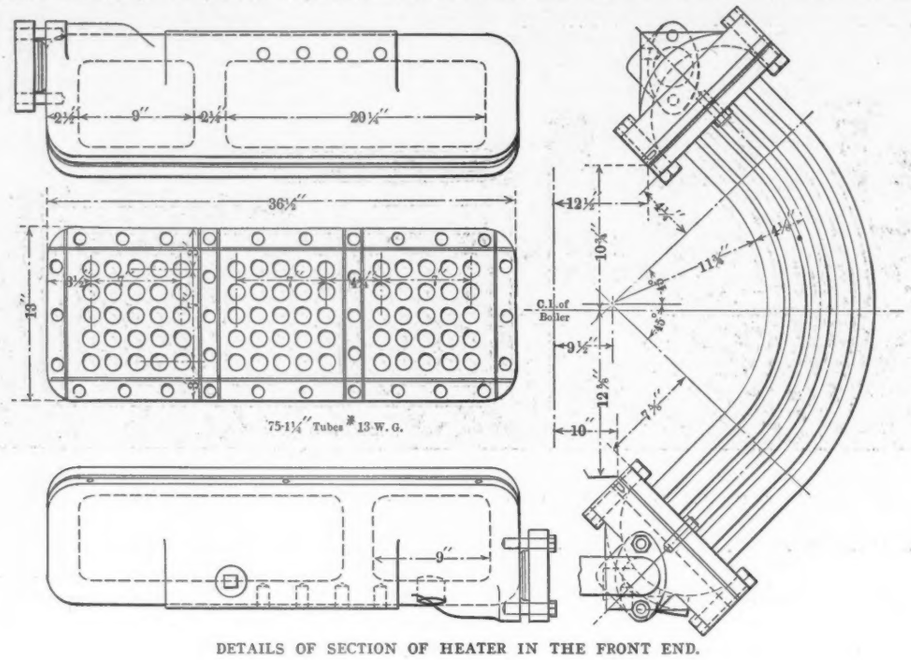
CENTRAL OF GEORGIA RAILWAY.

It is generally admitted, by those who have made a study of the subject, that the enormous internal strains caused by the injection of comparatively cold water into a locomotive boiler are responsible for a large part of the universal difficulty that has been experienced with keeping the modern large sized locomotive boilers from leaking. Experiments with devices for more thoroughly mixing the entering supply with the water already in the boiler have resulted in much improvement in this respect, but it is easily understood that to completely overcome trouble it would be simply a matter of heating the feed water to a temperature approximately that of the water already in the boiler, so that when it is admitted there will be but a slight difference in temperature and no local distortion in the plates. It is also easy to understand that whatever heat is put into the feed water before it enters the boiler will not have to be provided later from the fire-box. This, of course, provided the heat is obtained from waste sources, results in either less coal required to furnish the same amount of steam, or a larger boiler capacity with the same amount of coal burned.

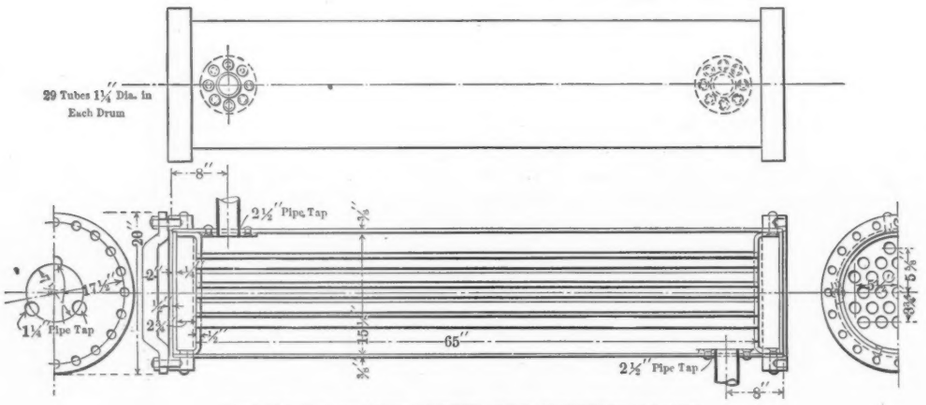
These advantages have been given more practical attention in those countries where the cost of fuel is very high, and where any device seeming to insure fuel economy has always been given



LOCOMOTIVE FEED WATER HEATER SHOWING COURSE FOLLOWED BY THE WATER.



DETAILS OF SECTION OF HEATER IN THE FRONT END.



DETAILS OF HEATERS UNDER THE RUNNING BOARDS.

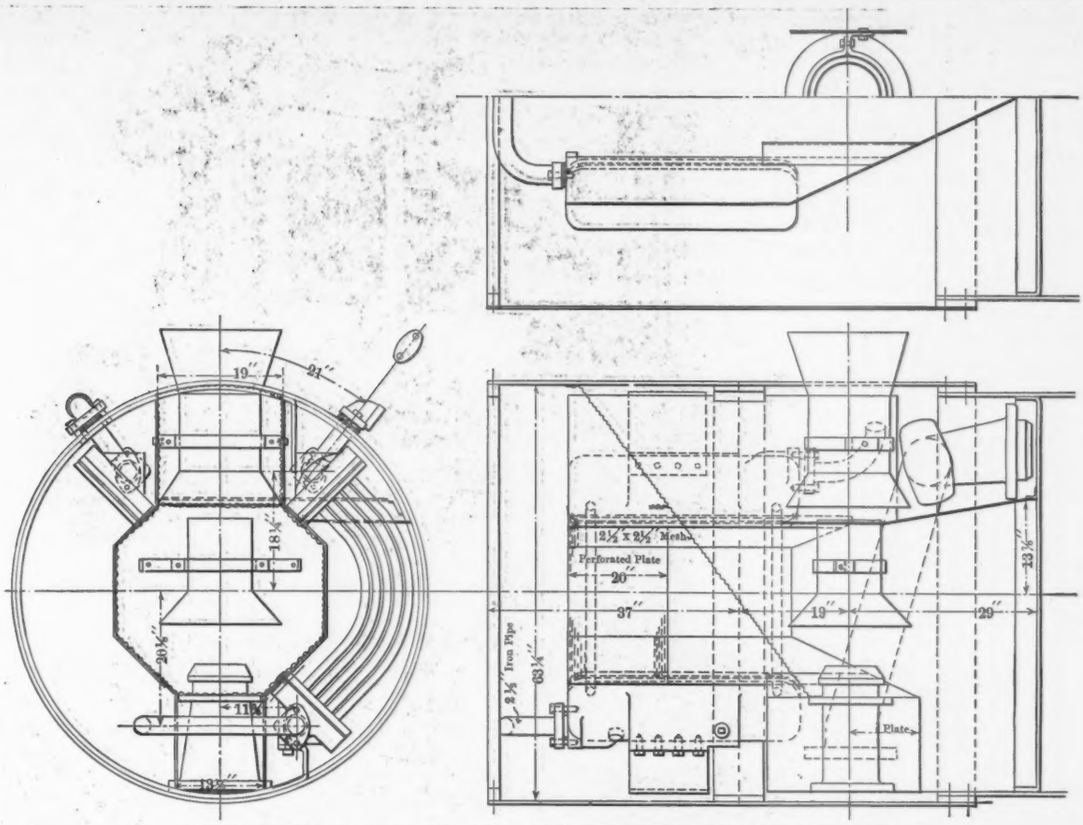
most careful attention and thorough testing than they have in this country, and feed water heaters of various designs have been successfully fitted to a large number of foreign locomotives. One of the most successful of these was applied by Mr. Trevithick, locomotive superintendent of the Egyptian State Railways, whose design was illustrated on page 436 of the November, 1907, issue of this journal. An economy of approximately 20 per cent. is reported by the use of that heater.

One of the first attempts to develop the capabilities of real feed water heating, under American conditions, is now being made by Mr. F. F. Gaines, superintendent of motive power of the Central of Georgia Railway, who has recently received a consolidation locomotive from the Baldwin Locomotive Works fitted with a heater of his design, which in principle follows that so successfully installed by Mr. Trevithick.

The constructional features of this heater are shown in the illustrations and in brief it consists of first, a duplex, horizontal, feed pump, which delivers the water to two heater drums secured beneath the running boards, one on either side, and connected in series. These drums are filled with small tubes through the interior of which exhaust steam from the feed and air pumps and also some from the exhaust passage of the cylinders is passed. The feed water circulates around the outside of the tubes and absorbs the heat from this steam. It then passes to a heater in the front end, which is designed along the same lines as is used by the Baldwin superheater. After traversing a path approximately 25 ft. long through these tubes and heaters, in which it absorbs the heat from the front end gases, a deflector plate being provided to compel them to pass around the tubes before going to the stack, it is delivered to the boiler check valve located in the usual position on the left-hand side.

The water passing through the different heaters is driven at a very low velocity, not exceeding 16 ft. per minute, and hence is given ample opportunity to absorb large amounts of heat. Although tests have not yet been completed to show exactly what temperature is attained at each stage, it is fair to assume from the figures obtained by Mr. Trevithick that the water will probably be delivered to the boiler at something over 300 degrees. (Water or steam at 200 lbs. pressure has a temperature of 387.5 degrees.)

The greatest objection which can be offered to a heater of this design is the trouble which would be experienced in the depositing of all of the incrusting matter in the feed water upon the tubes of the various heaters, so that they would soon become seriously clogged up and make the arrangement useless. We are advised, however, that this difficulty has been considered in connection with designing this heater and that the locomotive is to be used in service where the water contains little hard scale forming impurities. Since the temperature in the various heaters is comparatively low there will be no tendency for this scale to bake on and it can no doubt be easily washed out. Washout plugs have been provided in the side heaters and the lower drums of the front end heater. However, under conditions where bad water would have to be used the heater could be so re-designed as to permit that section in which the largest part of the incrusting matter was thrown down to be removed and cleaned, which would thus give the heater a very large advantage because of its ability to keep these impurities out of the boiler itself.



ARRANGEMENT OF FRONT END APPARATUS—LOCOMOTIVE FEED WATER HEATER.

The locomotive to which this heater is fitted has the following general dimensions:

GENERAL DATA.	
Gauge	4 ft, 8½ in.
Service	Freight
Fuel	Bit. coal
Tractive effort	34,000 lbs.
Weight in working order	168,200 lbs.
Weight on drivers	150,500 lbs.
Weight on leading truck	17,700 lbs.
Weight of engine and tender in working order	288,000 lbs.
Wheel base, driving	16 ft.
CYLINDERS.	
Kind	Simple
Diameter and stroke	20 x 28 in.
Kind of valves	Bal. slide
WHEELS.	
Driving, diameter over tires	56 in.
Driving journals, diameter and length	8½ x 10 in.
BOILER.	
Style	E. W. T.
Working pressure	200 lbs.
Outside diameter of first ring	61 in.
Firebox, length and width	96⅛ x 66 in.
Firebox water space	F.—4, S. & B.—3 in.
Tubes, number and outside diameter	283—2 in.
Tubes, length	14 ft. 8 in.
Heating surface, tubes	2,161 sq. ft.
Heating surface, firebox	146 sq. ft.
Heating surface, total	2,307 sq. ft.
Grate area	44 sq. ft.
TENDER.	
Water capacity	6,000 gals.
Coal capacity	8 tons

CARS AND LOCOMOTIVES BUILT IN 1907.

The total number of railroad cars built in the United States and Canada during the year 1907 was 289,645, an increase of 19 per cent. over the record-breaking output of the previous year. This includes subway and elevated cars, but does not include electric street or interurban cars. Of the total number of cars built by manufacturers 284,188 were for freight service and 280,216 of the total were for domestic use. The number of passenger cars is an increase of more than 70 per cent. over the previous year. About 72 per cent. of the freight cars built were of steel or steel underframe construction. Canada built 9,159 freight cars and 106 passenger cars. None of these figures include the cars built by railroad companies in their own shops. The total number of cars built in the U. S. and Canada in 1905 was 168,006 and in 1906 was 243,670.

The twelve locomotive builders in the U. S. and Canada built 7,362 locomotives during the year, of which 798 were for export. This is an increase of 6 per cent. in the total output. There were 330 electric locomotives and 240 compound locomotives built during the year. The Canadian output was 264. The figures for the total number of locomotives built in the U. S. and Canada for the year 1905 was 5,491 and for 1906 was 6,952.

The total amount spent by the railroads for new rolling stock approximates $477,000,000, an increase of about 25 per cent. over the previous year.—*Railroad Gazette.*

SHRINKAGE OF WOOD WHEN DRIED.

Interesting experiments on the shrinkage of wood due to the loss of moisture have recently been completed by the Forest Service at its timber testing station at Yale University. These experiments show that green wood does not shrink at all in drying until the amount of moisture in it has been reduced to about one-third of the dry weight of the wood. From this point on to the absolutely dry condition, the shrinkage in the area of cross-section of the wood is directly proportional to the amount of moisture removed.

The shrinkage of wood in a direction parallel to the grain is very small; so small in comparison with the shrinkage at right angles to the grain, that in computing the total shrinkage in volume, the longitudinal shrinkage may be neglected entirely. The volumetric shrinkage varies with different woods, being about 26 per cent. of the dry volume for the species of eucalyptus known as blue gum, and only about 7 per cent. for red cedar. For hickory, the shrinkage is about 20 per cent. of the dry volume, and for longleaf pine about 15 per cent. In the usual air dry condition from 12 to 15 per cent. of moisture still remains in the wood, so that the shrinkage from the green condition to the air dry condition is only a trifle over half of that from the green to the absolutely dry state.

RAILWAY STOREKEEPERS' ASSOCIATION.—The fifth annual meeting will be held at the Auditorium Hotel, Chicago, May 25, 26 and 27, 1908.

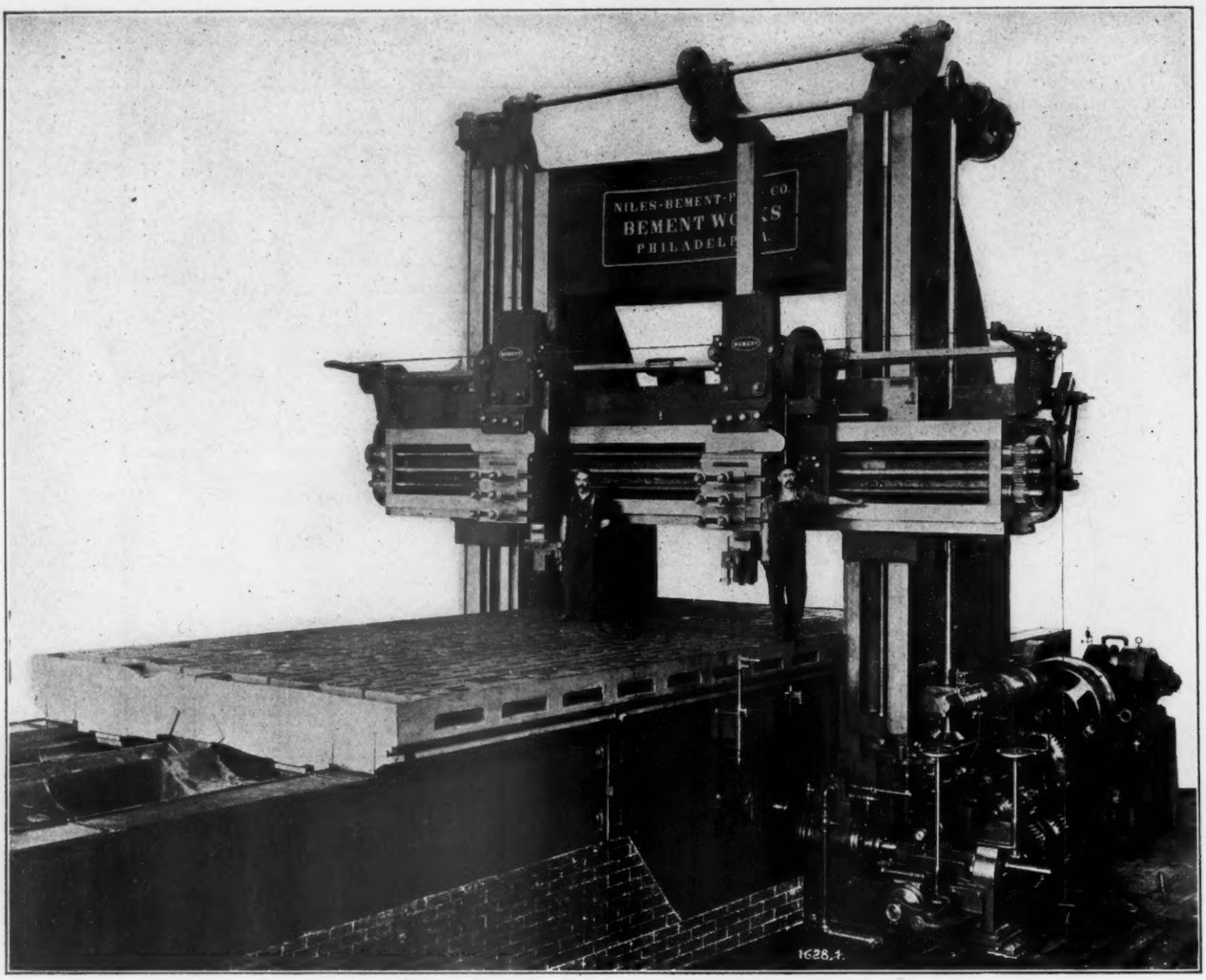


FIG. 1.—422½ TON PLANER. NILES-BEMENT-POND COMPANY.

THE LARGEST PLANER.

The McKintosh-Hemphill Company, of Pittsburgh, Pa., has recently received from the Bement Works, of the Niles-Bement Pond Company, what is believed to be the largest planer ever built.

Its total weight is 845,000 lbs., and four motors with a total capacity of 207½ h.p. are required to operate it. In addition to the movements found on a standard machine, many new ones have been added.

Each head is fitted with a slotter bar independently driven by a rack, giving a practically constant cutting speed from one end of the stroke to the other, and a quick return. Each head is arranged for transverse planing, having a movement across the bed. These movements for slotting and transverse planing make it necessary to throw out the regular driving mechanism to the table and connect it to a separate feed motion, entirely distinct from the regular feed motion. This throwing out of the driving mechanism means simply that the pneumatic driving clutches are thrown into and left in their idle position.

The machine is fitted with its own air compressor and motor, thus making it independent of the air supply in the shop, to which, however, it can be connected if it seems desirable. A complete switchboard is furnished for the control of all the motors.

The distance between uprights is 14 ft. 4 in.; the maximum distance from the table to the bottom of the cross slide is 12 ft. 2 in.; the maximum stroke of the table is 30 ft.; maximum stroke of the slotter bar is 8 ft.; total width of the bed 13 ft.; length of the bed, 60 ft.; table ways, 15 in. each in width; tool slides, 7 ft. 8 in., with 4 ft. vertical traverse; cross rail is long enough to admit full traverse of either head between the posts; face of uprights, 2 ft. 6 in.; vertical height of cross slide, including the top rib bracing is 5 ft. The main driving motor is 100 h.p.; slotting and cross planing motor is 50 h.p.; lifting motor to cross slide, 20 h.p.; traverse motor for heads on cross slide, 7½ h.p.; air compressor motor, 30 h.p.

The cutting and return speeds are variable through the motor, which has a 1 to 1¼ variation, and by change gears. The cutting speeds are 14 to 25 ft. and return speeds 52½ to 65½ ft. The same type of drive is used for the slotters and gives a cutting speed of 18½ to 30 ft. and return speed of 57 to 71 ft. Cutting speed for cross planing is 11½ to 19 ft. and return speed 35 to 43½ ft. The cross traverse speed to the heads is 50 in. per minute; the vertical speed for raising and lowering the cross slide is 26 in. per minute.

The main drive from the 100 h.p. motor is clearly shown in Figs. 1 and 3. The speed of the pneumatic reversing clutches may be varied to some extent by changing the speed of the motor, and a greater variation may be obtained by the simple reversing of two change gears. The pneumatic clutches which are shown thoroughly incased are of the Niles-Bement-Pond type with a large number of friction discs, whereby great friction area is obtained in a comparatively small compass. These clutches are operated by compressed air. A small valve, easily moved by hand, controls the stopping, starting and reversing of the table and handles satisfactorily the power given out by the large driving motor. From this point to the rack the drive is, in practically every respect, that which is found on any planer, except, of course, in this instance, it is exceptionally heavy and powerful. The two bull pinions are forged directly on the shaft, being cut half pitch apart, in order to give smoothness of motion.

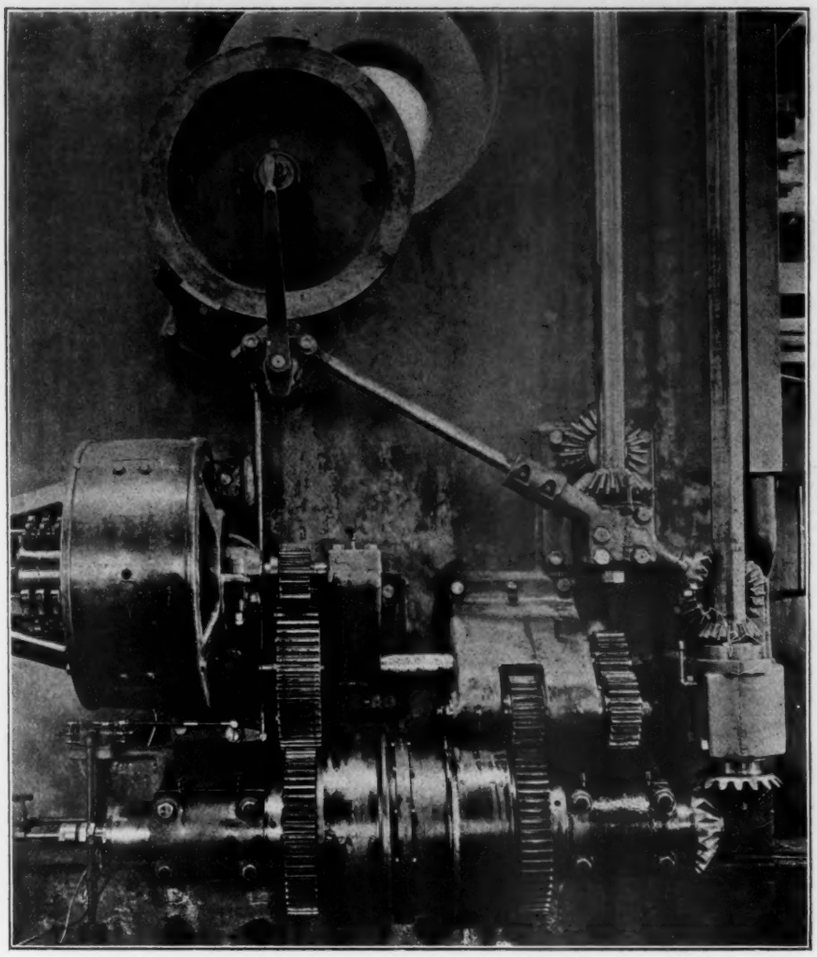


FIG. 2.—DRIVE FOR THE SLOTTER ATTACHMENTS.

An interesting feature is the pneumatic feed. The feed for the cross heads is clearly shown in Fig. 3. On the side of the upright just above the gearing is a cylinder with a piston rod extending to the left. This rod carries a rack which meshes into a gear near the bottom of the vertical feed shaft. This shaft has on its lower end, a bevel gear meshing into another bevel gear on a horizontal shaft, which transmits motion to the vertical feed shaft on the left-hand upright. The movement of these feed shafts is constant at all times and variation in amount and direction of head feeds is obtained by adjusting the connecting rod in the slotted cranks on tne ends of the cross slide. These cranks are graduated in such a way that definite cross and vertical feeds can be obtained, and by using at the same time the cranks on both sides an angular feed can be given to the tool, which is at times desirable, as the heads were not designed to swivel. The valve for controlling the air to the feed cylinder is thrown automatically at each end of the stroke, this movement being taken from either the main driving gear train to the table, or the slotter gearing, when slotting is being done. To throw out the feed, it is simply necessary to close a valve, cutting off the air supply.

The feed for the table, when slotting or transverse planing is being done, had not yet been placed in position when the photo, Fig. 3, was taken, but it is shown in Fig. 1, directly in front of and at the base of the upright. This feed operates practically the same as the feed for the cross head previously described,except that variation in stroke or amount of feed is obtained by an adjustable stop which regulates the amount of movement of the piston in the cylinder. This adjustment is made by the right-hand hand-wheel; the left-hand hand-wheel is for connecting and disconnecting the feed mechanism to the main driving works.

The slotter drive is shown in detail in Fig. 2. The description of the main drive on the opposite upright fits this one up to and including the pneumaitc clutches. For the main drive, the power is then carried through the upright into the bed while for the slotter drive it is transmitted to the vertical square shaft and thence by bevels and spur gearing to the horizontal square shaft running along the top of the cross slide. The pinion of this shaft drives the large gear, of which only the cover can be seen. The rack pinion which gears into the back of the cutter bar is on the same shaft with this gear. The pinion on the square shaft slides and can be thrown in or out of gear as desired, so that either or both bars can be used. The disc shown just above the motor controls the length of stroke. This disc is driven from the main train of slotter gearing and the adjustable stops on its periphery can be set at any desired point and effect the reversal in the same way as do dogs on the side of a planer table. Near the bottom of the square vertical shaft may be seen the bevel gear on the end of a horizontal shaft, which goes across the bed and can be connected to the mechanism operating the valve of the feed cylinder on the opposite side, as mentioned in the description of the feed for the heads.

In Figs. 1 and 3 can be seen a vertical shaft where the reversing hand lever of a standard planer is usually found; it will be

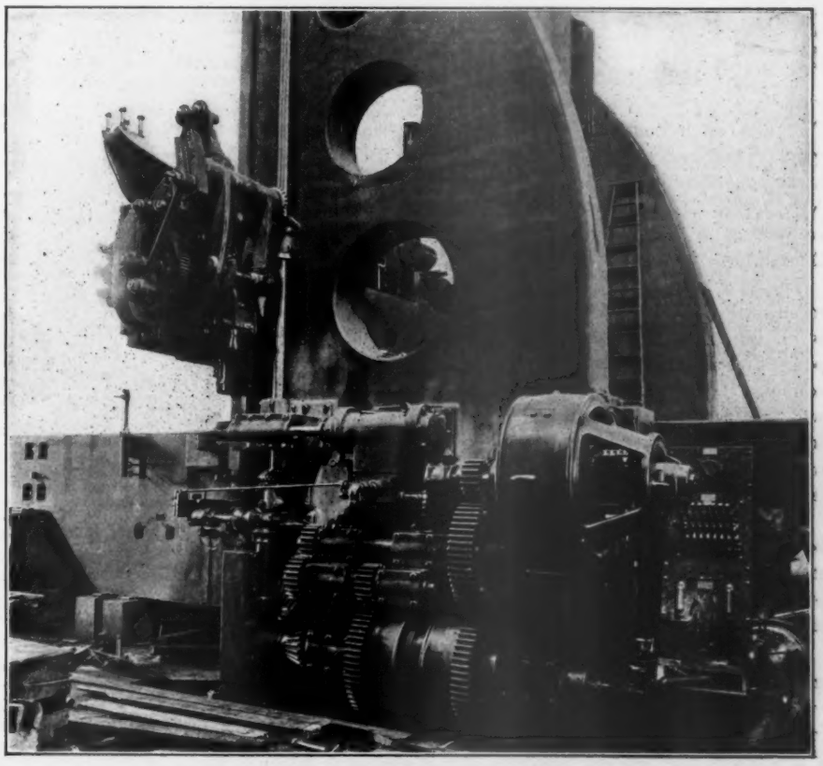


FIG. 3.—SIDE VIEW SHOWING THE MAIN DRIVE.

noticed that there are two sockets at the upper end, in one of which is a handle. The upper socket is connected to a shaft which runs down to the bottom lever or crank and forms the hand-control of the slotter. The lower socket is the one that controls the movement of the table when regular planing is being done and is connected by a lever and rods to the reversing dogs on the bed on both sides. Only one handle is furnished for each side and thus mistakes arising from throwing the wrong lever are avoided.

Owing to the great weight and large dimensions, it was impracticable, both from a manufacturing and a shipping standpoint, to make the bed or table in one piece. They were, therefore, divided to bring them within reasonable limits. The central section of the bed is divided longitudinally into three parts and the two end sections into two parts, or seven parts in all. The total weight of the bed is about 275,000 pounds. The table is made in two sections divided longitudinally in the center and weighs about 140,000 pounds.

The motor for fast traverse of heads is shown on the end of the cross slide in Fig. 3. The reversing is done through friction clutches and a safety is provided which prevents throwing in the fast traverse and the feed mechanism at the same time. The motor for operating the rail is situated at the top of the upright, as shown in Fig. 1. This motor is connected at all times to the elevating screws and is stopped, started and reversed electrically.

HENDERSHOT SHAFT COUPLING.

A new shaft coupling of great strength, and which may be quickly and conveniently applied, has just been placed on the market by Manning, Maxwell & Moore, Inc., of 85 Liberty street, New York. It is known as the Hendershot; the different parts, as well as an assembled view, are shown in the accompanying illustrations.

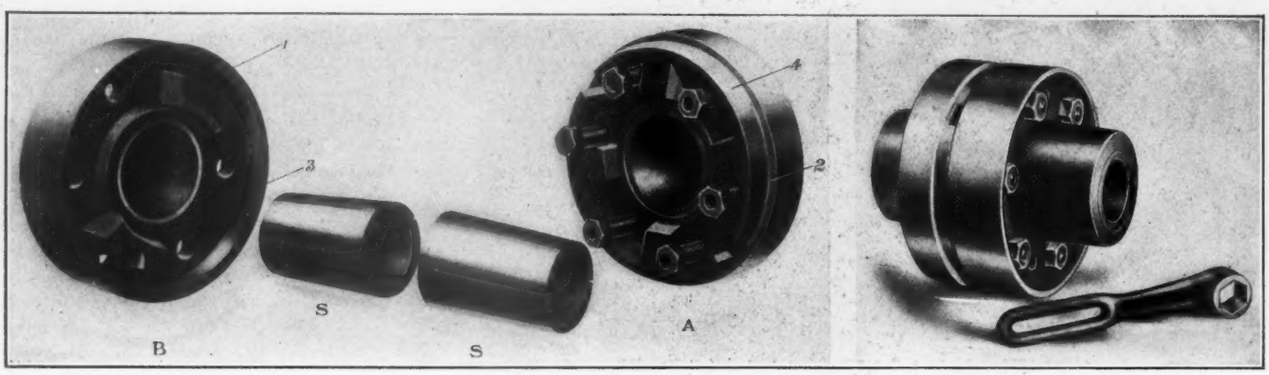
The two short taper compression sleeves, S-S, make it possible to slip the two halves of the coupling in place while the shafting is on the floor, hoist the pieces of shafting into position independently, and bolt them together as easily as the plain flanged coupling, but without the large amount of preliminary work which is necessary to put the flanged coupling on the shaft and true up the faces. Although it is not shown in the illustration, one of the four slots in each sleeve is cut through the entire length of the sleeve, thus allowing greater compression.

The shells A and B have lugs which interlock and relieve the bolts of shearing strains, thus making a rigid and durable construction. However, more bolts than usual are provided because of the large compression area of the coupling and to provide an unusually large factor of safety.

In applying the coupling the shells A and B are first slipped on the shafting. Sleeves S-S are then put in place and the shells are drawn over them, the lugs being brought into an interlocking position. The shells are then bolted together; the fits 3 and 4 practically true up the coupling, but perfect alignment is assured by keeping the faces 1 and 2 parallel. The coupling is easily taken apart by screwing two bolts in holes that are tapped in one of the shells, thus forcing them apart.

This coupling makes possible a considerable saving in time in putting up shafting and is specially advantageous where it is necessary to put up an additional piece of shafting and couple it to the end of a piece already erected and in use.

If the shafts to be coupled vary a little in size the Hendershot coupling will adjust itself. The coupling is made of the best gray iron and every coupling is put together on a test pin and inspected before it leaves the factory.

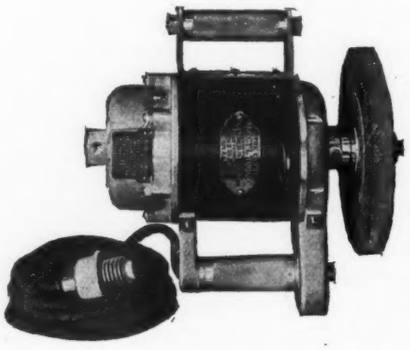


HENDERSHOT SHAFT COUPLING.

PORTABLE METAL GRINDING AND BUFFING MACHINE.

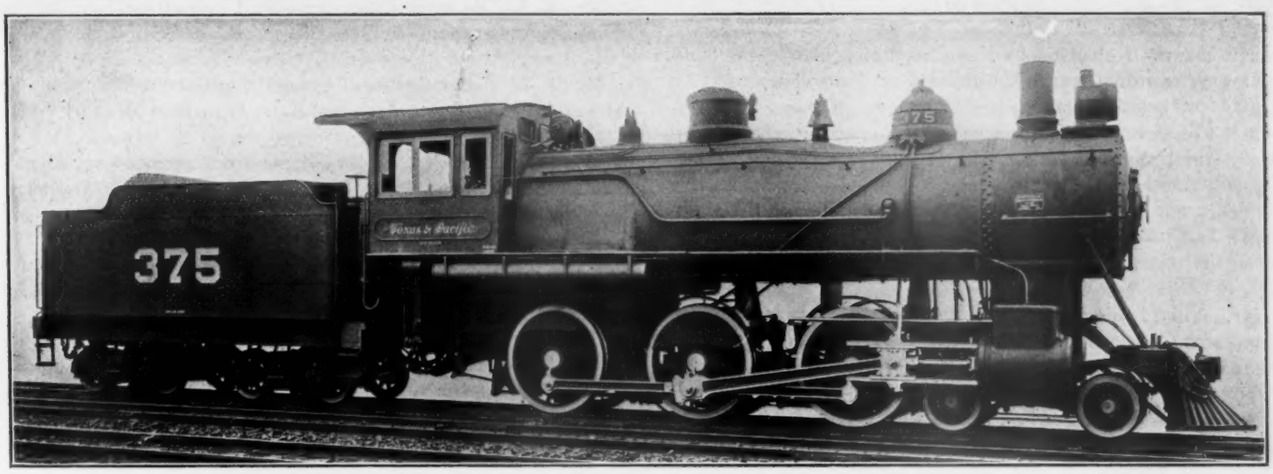
A portable, electrical grinding machine for use in grinding castings in machine shops and foundries, or for buffing, is illustrated herewith. The operating and controlling switch is located in the right hand handle and the operator does not, therefore, have to release his hold on the machine in order to start or stop it. The machine is air cooled by a rotary fan mounted on the armature shaft. The bearings are of phosphor bronze, are arranged for convenient lubrication and are provided with dust proof oilers.

It is designed so that a buffing wheel or a specially shaped emery wheel may be interchanged. The emery wheel is 8 in. in diameter and has a ¾-in. face. The machine has an eye-bolt fitted on the top so that it can be suspended from a spring, or be provided with a cord and counterbalance, relieving the operator of the weight. It weighs 25 lbs. complete and is furnished for 110, 220 or 550 volts direct current. It can also be wound for any special voltage from 75 to 650. As regularly furnished it is provided with 10 feet of attaching cord. Power may be taken from any ordinary lamp socket.



PORTABLE ELECTRICAL GRINDER AND BUFFING MACHINE.

These grinders are made by the Cincinnati Electrical Tool Company, Cincinnati, Ohio.



VERY HEAVY TEN-WHEEL FREIGHT LOCOMOTIVE—TEXAS & PACIFIC RAILWAY.

TEN-WHEEL FREIGHT LOCOMOTIVE.

TEXAS & PACIFIC RAILWAY.

The American Locomotive Company has recently delivered from its Rogers works to the Texas & Pacific Railway twenty locomotives of the ten-wheel type. These engines have been placed in freight service and are now successfully handling trains of 885 tons on maximum grades of 1½ per cent.

For locomotives of this type, intended for freight service, these engines exceed in total weight anything on our records. They also are designed to give a ratio of weight on drivers to total weight which approaches that usually found in consolidation locomotives. Of the total weight of 197,000 lbs., 165,000 or 84 per cent. is carried on the driving wheels. The average figure for this type of locomotive is from 75 to 76 per cent. To attain this, the front pair of driving wheels has been located but 90 in. back of the centre line of the cylinders and but 52 in. from the centre of the rear truck axle. This weight on drivers gives an average load per driving axle of 55,000 lbs., which approaches the maximum that has been attempted in this country.

The cylinders are 22 x 28 in.; the boiler pressure 210 lbs., and the driving wheels 63 in. in diameter. This gives a maximum tractive effort of 38,400 lbs., and a ratio of adhesion of 4.3. The cylinders are equipped with balance slide valves actuated by the Stephenson type of valve motion. The valves have a maximum travel of 6 in. and are set with a lead of 1-32 in. in full gear.

The boiler, as can be seen from an inspection of the ratios, is of the usual size and capacity for this weight of locomotive. The barrel is built up of three rings, of which the centre one is the slope sheet. The firebox, which has a vertical back head and throat, offers nothing novel in design. The crown sheet is supported by crown bars. The mud ring is 3½ in. wide at the back, which space increases to 5 in. at the crown, and is 5 in. wide at the sides and front.

A departure from the present ordinary practice is the use of under-hung springs on these locomotives. A semi-elliptic spring is carried under each journal box, the weight being transferred to it by wrought iron hangers hooking over the top of the box. The three pairs of driving wheels on either side are equalized together. The frames are 5 in. wide, of cast steel, with double front rails.

The general dimensions, weights and ratios are as follows:

GENERAL DATA.

Gauge	4 ft. 8½ in.
Service	Freight
Fuel	Bit. coal
Tractive effort	38,400 lbs.
Weight in working order	197,000 lbs.
Weight on drivers	165,000 lbs.
Weight on leading truck	32,000 lbs.
Weight of engine and tender in working order	329,867 lbs.
Wheel base, driving	14 ft. 10 in.
Wheel base, total	26 ft. 4 in.
Wheel base, engine and tender	55 ft. 9¼ in.

RATIOS.

Weight on drivers ÷ tractive effort	4.30
Total weight ÷ tractive effort	5.13
Tractive effort x diam. drivers ÷ heating surface	825.00
Total heating surface ÷ grate area	63.50
Firebox heating surface ÷ total heating surface, per cent.	6.80
Weight on drivers ÷ total heating surface	56.00
Total weight ÷ total heating surface	67.00
Volume both cylinders, cu. ft.	12.30
Total heating surface ÷ vol. cylinders	236.00
Grate area ÷ vol. cylinders	3.78

CYLINDERS.

Kind	Simple
Diameter and stroke	22 x 28 in.

VALVES.

Kind	Bal. slide
Greatest travel	6 in.
Outside lap	1 in.
Inside clearance	0 in.
Lead in full gear	1/32 in.

WHEELS.

Driving, diameter over tires	63 in.
Driving, thickness of tires	3½ in.
Driving journals, diameter and length	10 x 13 in.
Engine truck wheels, diameter	30 in.
Engine truck, journals	6 x 10 in.

BOILER.

Style	E. W. T.
Working pressure	210 lbs.
Outside diameter of first ring	70⅛ in.
Firebox, length and width	99 x 67¼ in.
Firebox plates, thickness	⅜ & ½ in.
Firebox, water space	F. & S.—5, B.—3½ in.
Tubes, number and outside diameter	326—2 in.
Tubes length	16 ft.
Heating surface, tubes	2,731 sq. ft.
Heating surface, firebox	200 sq. ft.
Heating surface, total	2,931 sq. ft.
Grate area	46.3 sq. ft.
Smokestack, diameter	18 in.
Smokestack, height above rail	189½ in.

TENDER.

Frame	13 in. channels
Weight, empty	54.700 lbs.
Wheels, diameter	33 in.
Journals, diameter and length	5½ x 10 in.
Water capacity	6,500 gals.
Coal capacity	12 tons

THE STOREKEEPER.—If the general storekeeper is going to keep intelligently in touch with the work of the road for which he is obliged to supply the materials, if he is intelligently to know that the amount of material which he has on hand is adequate and not too great, he must be in constant touch with the work that is going on in the field. He must know of his own knowledge all the operations of the road involving the use of material and how the material is issued and why it is used and how much of it is necessary or likely to be necessary for any given purpose, and above all things he must know personally what his subordinates are doing.—*Mr. G. G. Yeomans at the meeting of the Railway Storekeepers' Association.*

TRAVELING ENGINEERS SHOULD BE INSTRUCTORS, NOT INSPECTORS.—Road foremen of engines and traveling engineers ought not forget that they are instructors, not mere inspectors, and as good instructors they need never be without a good subject to discuss as the men will furnish the questions in abundant volume just as soon as they realize that the instructor is also an ordinary man who does not pretend to be beyond "showing."—*Mr. D. R. MacBain before the Traveling Engineers' Association.*

PERSONALS.

Mr. Harvey Halverson has been appointed master car builder of the Wisconsin Central Ry. at Fond du Lac, Wis.

Mr. Elliott Brooks has been appointed master mechanic of the Mobile and Ohio R. R. at Whistler, Ala., succeeding Mr. Enright.

Mr. L. G. Wallace has been appointed acting master mechanic at Guadalajara, Mexican Central Railway.

Mr. Willard Lincoln, master mechanic of the St. Paul and Minnesota divisions of the Northern Pacific Railway, has resigned.

Mr. Carl J. Mellin, formerly designing engineer of the American Locomotive Company at Schenectady, has been appointed consulting engineer.

Mr. R. D. Gibbons has been appointed general foreman of the Saltillo shops of the Mexican Central Railway, vice Mr. J. G. Smith, transferred.

Mr. R. N. Millice has been appointed master mechanic of the Aguascalientes Division of the Mexican Central Railway, vice Mr. R. D. Gibbons, transferred.

Mr. J. W. Cyr, assistant master mechanic of the Chicago, Burlington and Quincy Railway at Hannibal, Mo., has been promoted to master mechanic.

Mr. M. Marea, road foreman of engines, has been appointed master mechanic of the Toledo, St. Louis & Western Ry. at Frankfort, Ind.

Mr. J. M. Barnes has been appointed master mechanic of the Rio Grande, Sierra Madre & Pacific Ry., with office at Ciudad Juarez, Mexico.

Mr. C. J. Morrison has been appointed standardizing engineer of the Atchison, Topeka & Santa Fe Railway, with headquarters at Topeka, Kans.

Mr. W. J. Dempster has been appointed master mechanic of the Monterey Division of the Mexican Central Ry., vice Mr. J. A. Lewis, transferred.

Mr. Grant Hall has been appointed superintendent of motive power of the western lines of the Canadian Pacific Ry., with office at Winnipeg, Man.

Mr. C. T. Hessmer has been appointed master mechanic of the Minnesota division of the Northern Pacific Railway, with headquarters at Staples, Minn.

Mr. Silas Zwight has been appointed master mechanic of the St. Paul division of the Northern Pacific Railway, with headquarters at Minneapolis, Minn.

Mr. George W. Dickson, master mechanic of the Chicago, Indianapolis & Louisville R. R. at Peru, Ind., has resigned to take a similar position with the Grand Trunk Ry.

Mr. E. A. Walton, division superintendent of motive power of the New York Central R. R. at Oswego, has been transferred to West Albany in the same capacity.

Mr. S. W. Mullinix, superintendent of motive power of the southwestern district of the Chicago, Rock Island & Pacific Ry., has transferred his office from Topeka to Horton, Kan.

Mr. J. C. Crawford, fuel engineer of the Chicago, Burlington & Quincy Railway, has had his jurisdiction extended to include the inspection of all coal used by the system.

Mr. K. L. Dusser has been appointed master mechanic of the Chicago, Indianapolis & Louisville R. R. at Peru, Ind.

Mr. J. L. Butler has been appointed master mechanic of the Missouri Pacific Ry. at Atchison, Kan., to succeed Mr. L. J. Mills.

Mr. W. P. Chrysler has been appointed superintendent of motive power of the Chicago Great Western Ry., with headquarters at Oelwein, Iowa, vice Mr. J. E. Chisholm, resigned.

Mr. Charles E. Fuller, formerly superintendent of motive power of the Chicago & Alton R. R., will undertake some special work for the mechanical department of the Erie R. R.

Mr. F. H. Reagan has been appointed general foreman of the locomotive department of the Collinwood Shops of the Lake Shore & Michigan Southern Railway, vice Mr. A. O. Berry, promoted.

Mr. J. S. Enright, master mechanic of the Mobile & Ohio Ry. at Whistler, Ala., has resigned to become superintendent of motive power of the International & Great Northern Ry. at Palestine, Texas.

Mr. John Kelker, for 27 years and until his retirement three years ago, master mechanic of the Denver & Rio Grande Ry. at Denver, Colo., died at his home in Los Angeles, Cal., Dec. 18, aged 81 years.

Mr. W. F. Buck, mechanical superintendent of the eastern grand division of the Atchison, Topeka & Santa Fe Ry., has been appointed general superintendent of motive power, with headquarters in Chicago.

Mr. Lyman W. Barber, secretary of the Standard Car Truck Company, was accidentally killed on the tracks of the South Side Elevated Railway, Chicago, on the night of January 5. Mr. Barber was 60 years of age and a widower.

Mr. C. H. Osborn, division foreman of the Chicago & Northwestern R. R. at Fond du Lac, Wis., has been appointed master mechanic of the Madison division, with office at Baraboo, Wis., vice Mr. W. H. Huffman, retired under the pension rules.

Mr. J. H. McGoff, master mechanic of the Missouri division of the Atchison, Topeka & Santa Fe Ry. at Fort Madison, Iowa, has been appointed to succeed Mr. W. F. Buck as mechanical superintendent of the Eastern grand division, with headquarters at Topeka, Kan.

Mr. W. Kennedy, heretofore master mechanic of the Grand Trunk Ry. at Toronto, Ont., has been appointed superintendent of the motive power and car department of the Central Vermont R. R., with headquarters at St. Albans, Vt., succeeding Mr. James Coleman, resigned.

Mr. George H. Haselton, division superintendent of motive power of the New York Central, in charge of shops at West Albany, N. Y., has been appointed assistant to Mr. John Howard, superintendent of motive power, with headquarters at New York City.

Mr. William McWood, superintendent of car department of the Grand Trunk Ry., after fifty-two years' service, retired Jan. 1, under the provisions of the pension rules recently adopted by the company, and is succeeded by Mr. James Coleman, superintendent of the motive power and car department of the Central Vermont Ry., with office at Montreal, Que.

Mr. F. J. Cole, mechanical engineer of the American Locomotive Company, has been appointed consulting engineer of the same company, with headquarters at Schenectady, N. Y. The office of mechanical engineer has been abolished and the duties heretofore performed by that officer are now included in the jurisdiction of Mr. Dalton, chief engineer.

Mr. C. L. Bundy, general superintendent of the car department of the Hicks Locomotive & Car Works, Chicago Heights, Ill., has been appointed general foreman of the Delaware, Lackawanna & Western Ry. shops at Scranton, Pa.

Mr. Charles E. Fuller, superintendent of motive power of the Chicago & Alton Ry., has resigned and the jurisdiction of Mr. Peter Maher, superintendent of motive power for the Toledo, St. Louis & Western Ry. will be extended to cover the Alton.

Dr. Coleman Sellers, one of the most distinguished mechanical engineers of the 19th century, died at his home in Philadelphia, December 28, 1907, at the age of 81 years. Dr. Sellers' reputation as a scientist and inventor was world-wide. Possibly the best known of his many large undertakings was that of the development and utilization of the hydraulic power at Niagara Falls, the success of which was principally due to his advice and direction. Dr. Sellers was a member and past president of the American Society of Mechanical Engineers and a member of the American Society of Naval Architects and Marine Engineers; the American Society of Civil Engineers; the American Philosophical Society; the Institute of Civil Engineers and the Institute of Mechanical Engineers of Great Britain and of the Society of Arts of Geneva, Switzerland. In 1887 he received the Royal Norwegian order of St. Olaf, conferred upon him by the King of Sweden in recognition of his valued services in his profession.

BOOKS.

Proceedings of the American Railway Master Mechanics' Association. Forty-first Annual Convention, Atlantic City, June, 1907. Published by the Association. J. W. Taylor, Secretary, 390 Old Colony Building, Chicago, Ill.

In additon to the complete commttee reports and the discussion of the reports and topical discussions this volume contains the revised rules and corrected standards and recommended practice of the Association.

How to Burn Illinois Coal Without Smoke. Bulletin No. 15 of the Engineering Experiment Station, University of Illinois. L. P. Breckenridge, Director, Urbana, Ill. Free on request.

This pamphlet gives the results of some very valuable and interesting investigations in the matter of smokeless combustion with Illinois coal. A few pages are devoted to the principles of combustion and the losses due to smoking chimneys, but the larger part of the bulletin relates to the constructive features of boiler settings and furnaces for smokeless firing.

Traveling Engineers' Association. Proceedings of the Fifteenth Annual Convention, September, 1907. Edited by Mr. W. O. Thompson, Secretary, East Buffalo, N. Y.

This volume contains the complete papers, together with the discussion thereon, presented at the last annual convention of the Association held in the Auditorium Hotel, Chicago, September 3 to 6, 1907. Among others, were important papers and reports on the subject of lubrication; coal economy; automatic stokers; hot water for washing out; the smoke nuisance; air brake requirements and superheated steam. A complete list of the membership of the Association, which now numbers 632, is included.

Proceedings of the Master Car and Locomotive Painters' Association. Thirty-eighth Annual Convention. Published by the Association. A. P. Dane, B. & M. R. R., Boston, Mass., Secretary.

The thirty-eighth annual convention of this association was held at St. Paul, Minn., September 10 to 13, 1907. A number of very interesting and valuable reports were submitted by the committees which, taken in connection with the discussion thereon and the individual papers by members, makes these proceedings of special value to those interested in car and locomotive painting. The subject of painting steel equipment, both passenger and freight, was thoroughly considered. The proceedings require a book of 124 pages.

The Science Year Book. Edited by Major B. F. S. Baden-Powell. Published by King, Sell & Olding, Ltd., 27 Chancery Lane, W. C., London, England. 6 x 9 in., cloth. Price, $1.25.

The first part of this book, about 150 pages, is devoted to astronomical data; general information concerning the earth and climatic conditions; physical and chemical notes; metrology; a summary of the progress of science during the past year; a glossary of recently introduced scientific terms and names; directories of scientific and technical periodicals, British public institutions, offices and universities, British, American and Canadian scientific societies; and a biographical directory of scientists. The remainder, about 400 pages, is a diary for 1908, although copies may be obtained without the diary, if desired.

Proceedings of the American Railway Master Mechanics' Association. Fortieth Annual Convention, Atlantic City, June, 1907. Published by the Association. J. W. Taylor, Secretary, 390 Old Colony Building, Chicago, Ill.

This volume contains complete reports, and discussions thereon, of all the committees reporting at the last convention, which included those on auditing; blanks forms for history of locomotive movements at terminals; blanks for reporting work on engines undergoing repairs; development of motor cars; mechanical stokers; lubrication; spacing of flues; superheating; valve gears; width of track on curves and design of wheel centres. The volume also contains the standards and specifications of the Association as well as a complete list of the members.

Electrocraft. An illustrated list of approved electrical fittings and revised national electrical code. 5¼ x 7½. 389 pages. Bound in paper. Published by the Electrocraft Publishing Company, Detroit, Mich. Price, 50c.

This book includes a list of fittings that have been examined and approved by the Underwriters' National Electrical Assoc. for use under the rules and regulations of the National Board of Fire Underwriters. These fittings are, in general, illustrated and the name of the manufacturer is given. The national electric code contained in the book gives the rules and requirements of the National Board of Fire Underwriters for the installation of electric wiring and apparatus. This is also very completely illustrated. A complete and comprehensive index of both sections is included.

CATALOGS.

METAL SAWING MACHINES.—A series of leaflets have been received from Nutter, Barnes & Co., Boston, Mass., presenting data as to their metal saw cutting off machines; also a description of a 20 in. automatic saw sharpener.

LIFTING MAGNETS.—A handsomely illustrated catalog has been received from The Electric Controller and Supply Company, Cleveland, Ohio, describing the various types of lifting magnets made by it, and their uses.

CENTRIFUGAL FANS.—The Jeffrey Mfg. Co., Columbus, O., is issuing a catalog which illustrates the construction and gives a table of capacities of the Jeffrey centrifugal fans, especially as adapted for mine ventilation, but also suitable for ventilation of other kinds.

LOCOMOTIVE REDUCING VALVES AND AIR PUMP GOVERNORS.—A catalog from the Mason Regulator Company, Boston, Mass., describes in detail The Mason locomotive reducing valves and air pump governors, and gives directions for applying and cleaning them.

METAL PLANING MACHINES.—The line of planers manufactured by the Woodward & Powell Planer Company, Worcester, Mass., is attractively illustrated and described in a 93-page catalog, which is prefaced by a number of views of different parts of the works.

PIPE COUPLINGS.—The Fairbanks Company, 316 Second avenue, Pittsburg, Pa., is issuing a card giving an illustration of the Dart patent union couplings manufactured in both plain and galvanized iron, having bronze seats, ball bearings and ground joints. A table of prices and sizes varying from ⅛ to 3½ in. is given.

THERMIT WELDING.—The Goldschmidt Thermit Company, 90 West street, New York City, is issuing a leaflet which illustrates and describes the proper procedure for welding broken electric motor cases and clearly shows the great advantage of this method of repair, both as to cost of welding and the saving of time.

TURRET DRILLS.—A catalog from A. D. Quint, Hartford, Conn., describes various types of vertical turret drills. These are made in four sizes and with from four to twelve spindles.

DROP FORGINGS.—The drop forgings, including a large variety of wrenches, made by the Page-Storms Drop Forge Company, Springfield, Mass., are described in a very complete catalog received from them.

CORLISS ENGINES.—"Nomenclature of Murray Corliss Engines" is the title of a unique publication issued by The Murray Iron Works Company, Burlington, Iowa. It is known as Series D, No. 7. The names of the various parts are shown on assembled drawings of different types of these engines; also on perspective and sectional views of different portions of the engine. There are also a number of halftone illustrations.

A GIGANTIC PLANER.—The January number of the *Progress Reporter*, issued by the Niles-Bement-Pond Company, 111 Broadway, New York, is devoted entirely to the 422½ ton planer, recently furnished to the Mackintosh-Hemphill Company of Pittsburgh, and described in another page of this issue. A large double page, and fourteen full page illustrations, are presented in connection with a very complete description of the machine.

BALL BEARING DRILL PRESSES.—This is the title of an attractive catalog from The Henry & Wright Manufacturing Company, Hartford, Conn. The sensitive drills made by this company are of both the vertical type, with one or more spindles, and of the radial type. The use of ball bearings greatly reduces the friction, making the drills more efficient and economical. The Rice idler system of belting, which is used, furnishes four spindle speeds with two-step pulleys and one belt.

HIGH PRESSURE JACKS.—A small pamphlet from the Security Register & Manufacturing Company, St. Louis and New York, in which the Roth universal high pressure jacks are described. These jacks are fitted with ball bearings. Details are given of a test of a 20 ton jack made at the United States Navy Yard, New York. One man lifted 27.34 tons with an 8 in. lever and 41.73 tons with an 18 in. lever; also lifted 62.5 tons without injuring the jack.

NEW TYPE OF STORAGE BATTERY.—The Standard Electric Accumulator Co., 141 Broadway, New York, is issuing a very attractive catalog illustrating and describing its type of accumulator, which is distinguished by the fact that the plates cannot buckle or disintegrate, since each is inclosed in a very thin, strong and porous box of unglazed pottery. This accumulator is remarkably light for its capacity and is practically indestructible when given proper usage.

DRILLING MACHINES AND ENGINE LATHES.—A loose-leaf catalog from the Prentice Bros. Company, Worcester, Mass., illustrates and describes the various lines of drilling machines and engine lathes manufactured by them. These include sensitive drills; vertical drills arranged for belt or motor drive, also equipped with mechanical speed changing device and tapping attachments; radial drills and universal tables for use in connection with them; lathes of the ordinary, high speed and turret types.

GERMAN LOCOMOTIVES FOR EXPORT.—A. Borsig, locomotive builder, of Tegel, Germany, is issuing a pamphlet illustrating and describing many different designs of locomotives built by his works for export during the past two years. This pamphlet is printed in four languages, including English, and portrays some very interesting designs of locomotives. A table is included showing that the total output of these works to May, 1907, was 6,783 locomotives for service in 33 different countries. The more important dimensions of each design are included.

ELECTRIC GENERATORS AND SWITCHBOARD PANELS.—The Crocker-Wheeler Company, Ampere, N. J., are issuing a number of new bulletins, each of which confines itself to a description of certain separate machines or pieces of apparatus. One of these is devoted to small type direct current generators, showing these machines in several forms and including tables of capacities, sizes and speeds. Other bulletins are being sent out on the subject of switchboard panels, one being for three phase alternating current, another for induction motor panels, and the third for direct current combined generator and feeder panels.

SHOP AND FACTORY SPECIALTIES.—The Manufacturing Equipment and Engineering Company. 209 Washington street, Boston, Mass., has prepared a small catalog describing the specialties made by it. These include individual wash bowls arranged in batteries for shop and factory use; cylindrical metal lockers, known as the Cly-Mee-Co.; improved soda and potash kettles with thermostat; thermostatic controlling apparatus; shop stools, work benches and drawers; storage racks, standard bench legs and steel boxes and trays. The above equipment is made fireproof, as far as possible, and is designed to be thoroughly sanitary.

KARBOLITH FLOORING.—The American Mason Safety Tread Company, 702 Old South Building, Boston, Mass., is sending out a neat, concisely worded pamphlet describing Karbolith flooring, which is said to be fireproof, sanitary, noiseless, elastic, and durable. It is composed of different materials, some of which are of a fibrous and cellular nature and these produce a slightly elastic but hard and tough body. It is laid in a plastic state, similar to cement or plaster and hardens quickly. It weighs about 3 pounds to a foot when laid about ½ in. thick. Plates are presented showing the different colors and shades in which this material may be furnished.

ENGINES FOR DRIVING FANS.—The Massachusetts Fan Company, Watertown, Mass., has just issued an additional section to its perpetual catalog, which comprises 16 pages and is entitled "Vertical and Horizontal Engines for Fan Driving." This includes illustrations, descriptions and horse power tables. The entire catalog is now brought up to a total of 116 pages of exceptionally valuable matter relating to mechanical draft apparatus.

SHORT JACKS.—A folder from A. O. Norton, Inc., 286 Congress street, Boston, Mass., illustrates three new patterns of jacks which have been especially designed for heavy, low-set loads in roundhouses and car repair yards. The smaller one has a capacity of 25 tons, height of 9 in., rise of 3 in., and weighs 50 lbs. The second has a capacity of 35 tons, height of 20 in., rise of 8 in., and weighs 175 lbs. The most powerful one has a capacity of 50 tons, height of 20 in., rise of 5 in., and weighs 250 lbs.

ROLLING DOORS AND SHUTTERS.—Catalog No. 34 from the James G. Wilson Manufacturing Company, 3 West 29th street, New York, fully describes and illustrates the various types of rolling doors, rolling shutters, and partitions which are made by that company in bronze, steel and wood. Illustrations are given of corrugated rolling steel doors and shutters which have been in service for as long as thirty years or more. A test of a corrugated shutter made in the Underwriters' Laboratory, under instructions from the National Board of Fire Underwriters, is also described. Several illustrations shows applications of the different types of doors to railroad shops, roundhouses and freight houses.

CORK INSERTS FOR CLUTCHES AND PULLEYS.—Several pamphlets have been received from the National Brake & Clutch Company, 16 State street, Boston, concerning the use of cork inserts in clutches, pulleys and brakes. Reports of camparative tests of pulleys, made at the Worcester Polytechnic Institute, are given. These tests included the following types of pulleys: cast iron, cast iron with cork inserts and fiber with cork inserts. The use of cork inserts increases the coefficient of friction greatly.

Another of the pamphlets deals with the use of these inserts in connection with automobile clutches and brakes. A report of a test made by Prof. Hollis of Harvard University is reproduced showing the increase of the coefficient of friction due to the use of cork inserts in cast iron plates.

ELECTRICAL APPARATUS.—The General Electric Company is issuing a number of new bulletins, each being a complete and interesting description of some particular instrument or machine manufactured by it. These include bulletin No. 4,550 on carbon break circuit breakers, which are designed for small reliable automatic protective devices for both direct and alternating current. Bulletin No. 4,551 shows the Thompson horizontal edge-wise measuring instruments for switchboard service of all kinds. Bulletin No. 4,556 is on the subject of the series luminous arc rectifier system, which permits the operation of direct current luminous arc lamps from alternating current central stations. Bulletin No. 4,557 is on the subject of controllers for electric cars, particularly as adapted for high voltages.

BALL BEARINGS.—An attractive catalog has been received from the Chapman Double Ball Bearing Company of America, 40 Bristol street, Boston, Mass. The advantages of the Chapman double ball bearing are clearly presented in contrast to the ordinary ball bearing. A report of tests made by Mr. Henry Souther is given and different applications of the bearings are described and illustrated. These include shafting bearings, street car journal bearings, automobile wheel bearings and thrust and step bearings. Several letters of testimonial are given including one from the superintendent's office of the Gardner, Westminster & Fitchburg Street Railway Company, Gardner, Mass., in which the service given by a car equipped with ball bearing journal bearings that has been in service five years is described.

LOCKS.—Two interesting pamphlets, well printed, attractively illustrated, and forcibly bringing out the advantages of the Yale night latch, have been prepared for distribution by the Yale & Towne Mfg. Company, 9 Murray street, New York City. The first is entitled "The Night Latch, What It Is." The prominent features of the Yale lock are clearly presented by tracing its development and by means of a number of simple illustrations.

The second is entitled "His First Latch Key"; some of the advantages of the Yale night latch are incidentally brought out in connection with quite a readable storiette.

In addition to the above there are twelve slips or leaflets, each containing on one side a bit of "Yale lock philosophy" and on the other side an illustrated description of one of twelve types of night latches in general use.

NOTES.

WARD EQUIPMENT COMPANY.—Mr. A. E. Robbins has resigned his post with the Gold Car Heating and Lighting Company to take a prominent position with the Ward Equipment Company.

RIEHLE BROS. TESTING MACHINE COMPANY.—The Board of Directors of the above company, at a meeting held on December 30, declared an annual dividend of 6 per cent. on the capital stock of the company for the year 1907.

NEW ENGLAND FOUNDRYMEN'S ASSOCIATION.—Mr. Walter B. Snow, of Boston, a former president of this association, and now engaged in independent practice as a publicity engineer, was recently elected an honorable president.